THE METAL INDUSTRY

With which is Incorporated The Aluminum World.

The Brass Founder and Finisher and Electro Platers Review.

TRADE JOURNAL

RELATING TO THE NON-FERROUS METALS AND ALLOYS.

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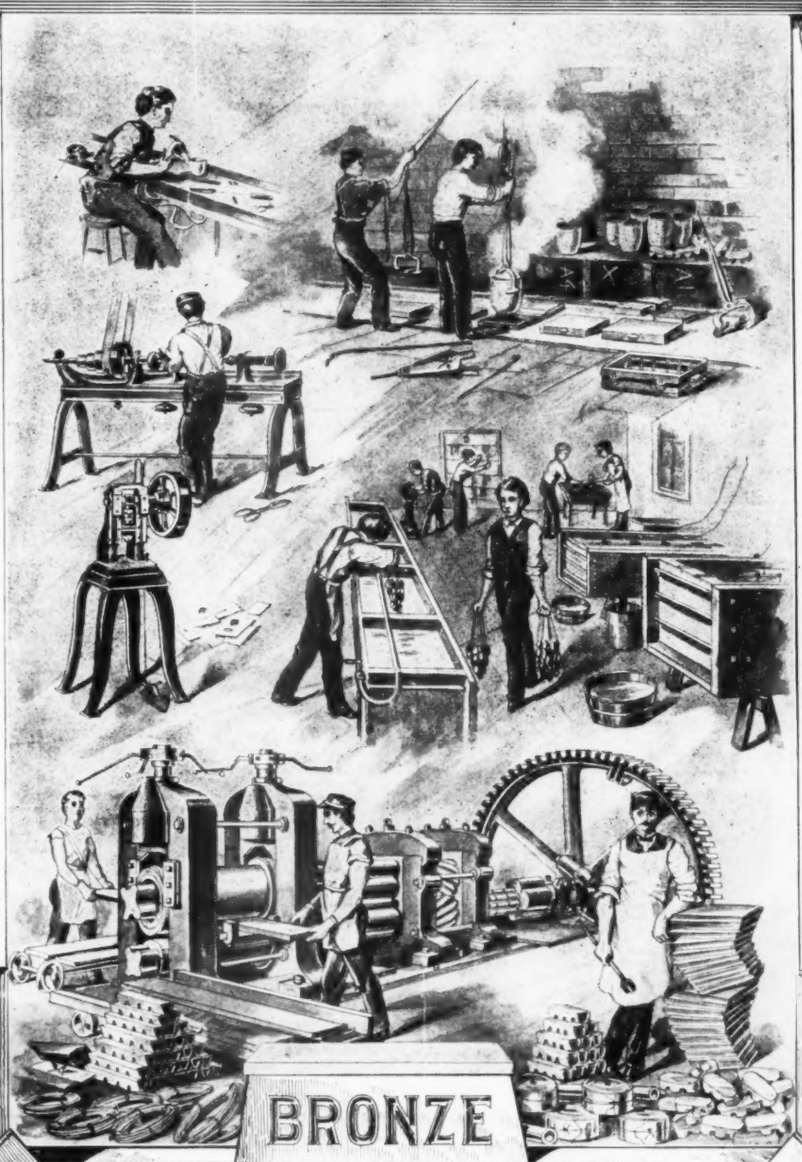

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OLD SERIES
Vol. IX., No. 9
Vol. I., No. 9
NEW SERIES

LABOR OMNIA VINCIT

SEPTEMBER 1903

NEW YORK.

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Entered February 10, 1903, at New York, N. Y., as second-class matter under act of Congress. March 3, 1879.

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THE METAL INDUSTRY
AND
THE ALUMINUM WORLD
AND
THE BRASS FOUNDER AND FINISHER
AND
ELECTRO PLATERS REVIEW

PUBLISHED MONTHLY BY

THE METAL INDUSTRY PUBLISHING COMPANY,

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ADVERTISING RATES ON APPLICATION

Entered February 10, 1903, at New York, N. Y., as Second Class Matter Under Act of Congress March 3, 1879.

NEW JUNK LAWS.

Laws recently passed by the Legislature of New York for the regulation of the sale of junk are interesting, and indicate how the innocent may be made to suffer for the guilty. Nearly every city has its own laws to regulate the purchase and sale of junk, but, as far as we are able to learn, this is the first instance in which a State has taken the matter into its own hands. Up to the present, the laws have been that of simple licensing, so that any unlawful transaction could be punished by the withdrawal of the license, but in the case of the recent New York laws the intention appears to have been to prevent the buying or selling of any material about which any question at all might be raised.

The act became lawful on May 5 and operative on July 1. The purpose of the act is to prevent the sale of stolen property. The conditions make it unlawful for any person, co-partnership or company to conduct a business known as a junk business without having first obtained a license from the proper authorities of the place in which the business is carried on. The license costs $5, and expires on June 30 of each year. Such a proceeding is, without doubt, proper; but other sections of the act are far more reaching. For instance, in Section 3 the provision is made that on purchasing any pig or ingot metal, copper, copper wire or brass car journals, the purchaser shall cause to be subscribed by the party or parties from whom the goods were purchased a statement as to when, where and from whom the property was obtained. The age, residence, street and number, and any other description which will serve to reasonably locate same, is likewise required. This information must be filed with the chief of police of the city in which the purchase was made.

In Section 4 the provision is made that the junk dealer shall keep each distinct purchase in a separate pile, bundle or package without melting, cutting or treating the package or any article thereof. A tag shall be placed on each package, pile or bundle, bearing the name and residence of the seller and the date and hour of purchase, together with place. The weight shall be marked on the tag. Each pile, bundle or package shall not be removed for a period of five

days following the purchase of same. Any violation of this act, either by the dealer or his agent, or by false statement on the tag, shall be a misdemeanor. An amendment to the penal code, made at the same time as the above act, provides that it is unlawful for the dealer to purchase from any child under sixteen years of age. This amendment, however, does not become operative until September 1.

We believe that these laws will result in hardship to the legitimate metal dealer, for whom they were apparently not intended. The transactions in old metals and junk is a matter of great magnitude, and for the dealer to be obliged to carry out all the provisions of the law will certainly have the tendency to restrict trade. Fluctuations in metal prices often require that old metals as well as new shall be quickly sold after purchase, and for each dealer to be obliged to keep a parcel of metal for five days will oftentimes result to his great loss. The amendment relative to the purchase from minors is undoubtedly an excellent one, but we believe that if the main act is enforced it will have a tendency to divert trade to other States which would under normal conditions be transacted in New York.

THE REVIVAL OF COPPER IN ART.

That color is one of the chief properties which determines the use of a metal in art is evidenced by the fact that platinum, a metal equally as non-corrosive and more valuable than gold, is rarely used for such a purpose. Its color is not pleasing.

There are only two colored metals known—copper and gold. It is not surprising, then, that copper should enter art work, as it is an open question whether, were copper equally as rare and non-corrosive as gold, it would not be more popular in jewelry and art. We believe that, under such conditions, the deep red color of copper would surpass the present pleasing yellow of gold, and thus become the standard metal, both for money and in art. The abundance of copper, however, and its susceptibility to atmospheric influences precludes any such conditions ever taking place.

Copper was one of the earliest metals known to mankind. Indeed, it is an open question whether it actually was not the very first metal known. In America it certainly was, for the immense deposits in the Lake Superior region furnished abundant material for the primitive races. The recent Egyptian explorations have demonstrated that copper was known to the early Egyptians. Leaving these questions for our archæological friends to solve, we do know that copper has been the metal used by the early civilized races for the manufacture of utensils of every description. This was a condition really necessary, for no other metal, outside of gold or silver, would have answered the purpose. Copper lends itself to all sorts of manipulations, and for this very reason the softness and ductility which it possesses rendered the manufacture of such uteusils a possible operation.

Crude as the very earliest of these utensils were, they were the beginning of the coppersmith's art, and through process of evolution the beautiful examples of copper work of a few centuries ago were produced. We say coppersmith, for it is customary to apply this name to workers in copper, but they were, in reality, the silversmiths and goldsmiths of that period, who, forced by trade conditions, plied their trade in all metals. Indeed, the early coppersmith of a few centuries ago wrought his wares in nearly the same manner that the silversmith does to-day. The hammer was his chief tool, and we doubt very much whether, except in certain minor operations, that his method of hammering up a piece of hollow-ware was radically different from that pursued by the silversmith of the present. Personal adeptness was then and is now paramount to everything else.

That the early coppersmith was adept in his art is indicated by the quality and beauty of his wares. Our present age appears to appreciate this fact, and every variety of ancient art is now being revived. Quite recently, however, has copper been revived, and now it has principally entered into the manufacture of hollow-ware. The makers of such wares appreciate the corrosive properties of copper, and in cases where the article is used for service the interior is silver-plated. We have recently seen articles which represent the very highest consummation of the art of coppersmithing—work which, in silver or gold, would indeed be classed as remarkable work—mugs, tankards, urns, loving cups, steins and every description of hollow-ware. Some are buffed with the highest possible finish, while others are left with the hammer marks, showing the vast amount of work which has been put upon it. Pewter, too, is often used to embellish the article, and silver or gold sometimes used. The work only need be seen to be admired.

OUR NEUTRALITY IN THE PROBLEMS OF LABOR.

We hear considerable criticism in regard to various trade journals which consider it their duty to discuss the perplexing labor problems which constantly appear on on the trade horizon. Such matter is readily obtained, and, no doubt, interests many of its readers, but we believe that it is, at the present time, without the province of a technical journal to indulge in the discussion of these problems, and for this reason we propose to avoid, if possible, being drawn into any such controversies. Our journal is intended for the dispensation of technical knowledge, and for the discussion of problems that affect the working of metals, and we, therefore, consider the labor question entirely foreign to our mission. We will, accordingly, respectfully decline any proposition or policy which would inveigle us into the discussion of these conditions, and believe that our readers do not seek it in a trade paper.

Several aluminum airships are under construction. Their inventors and builders hope to sail them to the Louisiana Purchase Exposition at St. Louis, 1904.

THE USE OF SHRINK BALLS ON PATTERNS.

By Erwin S. Sperry.

The advent of the strong metals has brought about many difficulties in making castings from them. The statement is made that such and such a metal is difficult to cast and that, in certain shapes, it cannot be cast at all. There is no doubt expressed but that the metal is a good one were it possible to cast it successfully. This, of course, lays the matter at the door of the molder, who usually has to bear the brunt of the blame. With large patterns the production of good castings is undoubtedly the duty of the molder and not the pattern maker, but in the case of small gated work I believe that a good job cannot be turned out if the molder does not have a properly made pattern. It is the function of the pattern maker in these instances to furnish a properly made pattern, and by this I mean one adapted to the metal which is to be cast. In the past all patterns have been made the same. One pattern has answered for iron, brass, bronze and aluminum. Early in the days of steel castings the fact that patterns must be adapted to the metal to be cast was thoroughly appreciated and now patterns are made in this industry which would have made the pattern maker of fifty years ago wonder at the condition of things. Malleable iron patterns are almost a similar instance as that of steel, and I have often heard molders say that they cannot do anything with a certain pattern on account of its having been made for malleable iron. I presume the malleable iron molder makes the same suggestion when a pattern gated for brass is brought to him, but my acquaintance with the malleable iron trade is so limited that I have not heard of it. At any rate, the fact remains that the reason that the majority of failures are experienced with the strong bronzes is on account of improperly made patterns.

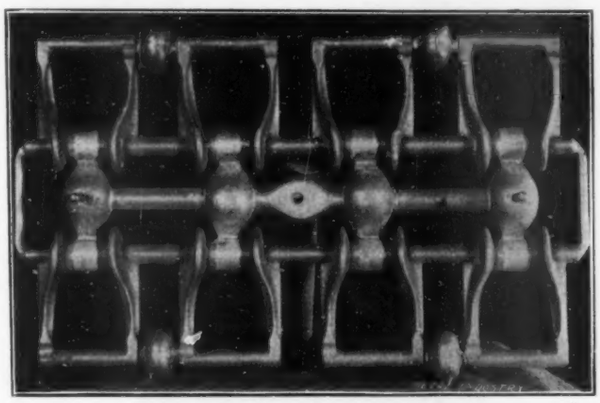


FIG. 1—THE USE OF SHRINK BALLS ON PATTERNS.

The strong bronzes are manganese bronze, aluminum bronze, and, among the other alloys, aluminum brass, delta metal, and, in fact, any of the alloys which contain aluminum. It is well known that a metal of high tensile strength for sand casting cannot be made without the use of aluminum, and the success of manganese bronze dates from the introduction of aluminum into it. The more the aluminum the greater the shrinkage, and this accounts for the fact that difficulty is experienced in casting. Manganese bronze contains from 0.50 to 1.00 per cent. of aluminum, depending upon the use to which it is to be put, so that really the strong copper alloys form a group by themselves in that they contain aluminum or are free from it. The aluminum is added for the purpose of giving sound sand casting qualities; without it an unhomogeneous and unsound casting results. It is only in sand, however, that aluminum is beneficial, for in chill castings it is a positive detriment.

Let us take the cast of managenes bronze, whose shrinkage is nearly twice that of ordinary brass. Very small gated work may be made with ordinary patterns, for there the disparity in proportion of the parts is so small that a uniform shrinkage takes place. With patterns of medium size, however, especially where there is some large portion and some small, there is usually experienced two difficulties. The light portions draw from the heavy in cooling and there is produced either cracks or shrinkage depressions. Such a phenomenon is caused by the fact that in cooling, the light portions of the metal cool first and draw from the heavy parts. The heavy parts, however, have nothing to draw from, as the gate and runner, being smaller than they, have already cooled. The theory of the cooling process is quite simple. All that is needed are portions of metal which will cool last and from which the heavy parts of the casting may draw. In large work this is invariably accomplished by the introduction of risers, which protrude through the cope and are made of heavy section, so that they will remain hot, while the remainder of the casting has cooled. Hot metal is often poured into a riser so as to prevent its chilling too quickly. One who has witnessed the "pipe" produced by the shrinkage of a large aluminum bronze or manganese bronze riser has no doubt as to the value of such agencies. Occasionally a molder will put on what he calls a "blind riser," or one that does not protrude through the cope. The mass is quite large and in many instances answers the purpose. These blind risers are analogous to "shrink balls" on gated work, and their function is identical—that is, to furnish a large mass of melted metal from which portions of the casting may draw while cooling.

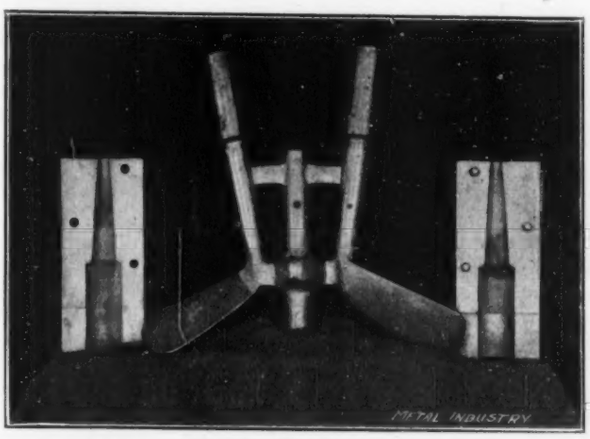


FIG. 2—THE USE OF SHRINK BALLS ON PATERNS.

The shrink ball may be placed on heavy or light portions or anywhere it is needed. Oftentimes trials are needed to indicate where they are required. Sometimes they are only necessary on the heavy parts, while in others they must be placed on both heavy or light. In Fig. 1 is shown the gated pattern of a chain-link for conveyor use. These were cast of manganese bronze and the pattern worked well. The shrink balls are, it will be noticed, placed in two parts; one on the runner to take care of the heavy part, while those at the side of the links were, after several trials, found necessary to prevent min-

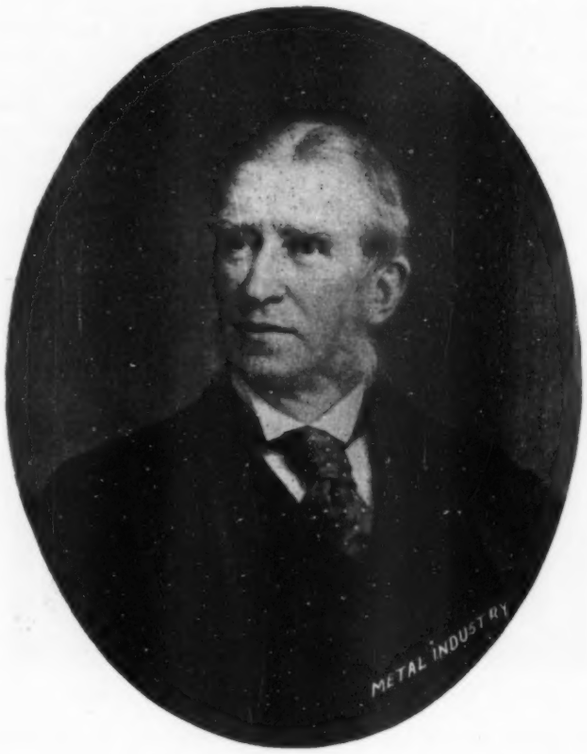
ute shrinkage pockets from forming in the interior of the casting. These little cavities, so often seen, are the result of shrinkage and are not blowholes, as many suppose. They result from uneven shrinkage and the consequent drawing from portions. According to the law of cooling, one would scarcely expect them to form in such a part, but they nevertheless do. I presume that this phenomenon is caused by the contact with the wet sand, which entirely alters the cooling conditions. At any event they have been found necessary and must be put on wherever needed. Constant attention to the study of the strong bronzes will surely indicate where such shrink balls are needed, but the pattern maker should endeavor to try his pattern before pronouncing it a success. Let him make the pattern to the best of his knowledge and belief and after that have several gates cast. Let him saw the portion of the casting through, so as to notice where the shrink holes appear. He will then be able to put the finishing touches on the portions where needed.

In the particular pattern shown in Fig. 1 the gating was done for use in a snap flask, but if the ordinary iron flask of the brass founder is desired the conditions may be readily altered. This pattern, of course, is made with core-prints for producing the hook necessary for coupling of the links. The prints, however, do not interfere in any way. Although made for manganese bronze, this particular pattern was used to a considerable extent for 10 per cent. aluminum bronze and worked equally as well. No bad castings were produced by its use, and I believe that the principle of gating for strong metals is correct.

In Fig. 2 is shown a pattern for casting a putter head for a golf club. In this instance the metal which was used was aluminum bronze, and in using the ordinary pattern great difficulty was experienced from the casting having a flaw or crack at the bend. The casting was made with a core (core box is shown), so that the handle could be inserted, and for this reason the heavy portion of the casting was at the gate. The flaw was apparently produced by the drawing of the gate from the casting, as the latter was heavier than the gate. After the shrink ball, as shown, was put on no further difficulty was experienced. When, however, the shrink ball itself was cut in two with a hack saw a cavity was invariably found. This shows that the casting drew from the shrink ball as desired. In this particular pattern there was an extra runner bedded in with it and it is not shown. Such a method was followed in order to give a long runner for the metal and thus clear itself from dross. If the entire runner was put on the pattern it would have balanced it badly. The shrink balls, also, interfere with a pattern and render it quite heavy, so that I believe that a collusion between the molder and the pattern maker will result in the pattern being made too small and the former invariably desires a light pattern so as to make an easy draw. Constant vigilance, therefore, is necessary to prevent such an occurrence and no pains should be spared to put plenty of metal where it is needed.

In conclusion I may say that I believe that the proper use of shrink balls on patterns will dispel the majority of difficulties with the average founder as with manganese bronze, aluminum bronze or other strong metals. It will not only prevent shrinkage pockets, but also cracks, as the latter are, in nearly all cases, caused by the same conditions. I would add one word, however, in this connection and that is to let it be the rule to well fillet all corners. This will eliminate any tendency to draw, although with the proper use of the shrink ball and riser, if necessary, the sharpest kind of an angle may be tolerated without bad results. It is better, however, not to invite difficulties and, indeed, renders the molder's task less arduous if the corners are well filleted. I believe that fillets are normal practice and an indication of good pattern work.

WILLIAM E. DODGE.



The death of William E. Dodge removes from the ranks a man of integrity, honesty and ability. Manufacturer, merchant and philanthropist, he was one of the best known men in the brass and copper trade of the United States.

William E. Dodge was the son of William E. Dodge, Sr., the philanthropist, who died in 1883. His ancestry on both sides were people of whom one might be proud. On his maternal side he was related to Anson G. Phelps, the founder of the well-known metal firm of Phelps, Dodge & Co., of New York, and after whom the city of Ansonia, Conn., was named. Like his illustrious father, he always manifested an interest in philanthropic and charitable work. At the time of his death he was interested in a large number of such organizations. His metal connections consisted of the presidency of the Ansonia Brass and Copper Company, member of Phelps, Dodge & Co., director of the American Brass Company and president of the Ansonia Clock Company. He was also a director of the Detroit Copper Mining Company, the Commercial Mining Company, the Copper Queen Consolidated Mining Company, the United Globe Mines, the Lackawanna Steel Company and many other enterprises. He was seventy-one years of age at the time of his death.

Edward Beecher Prindle, secretary and general manager of the Ronalds & Johnson Company, of New York and Brooklyn, died suddenly on Wednesday evening, August 19, from the effects of a surgical operation. He had been connected with the Ronalds & Johnson Company for seventeen years and was prominent in plumbing supply circles.

KAYSERZINN.

By Erwin S. Sperry.

Had this alloy made its appearance from any other source than a foreign country it is doubtful whether it would have obtained the *prestige* which it now has. It is now some two or three years since the importations of the material began and, while such alloys or metals can never replace silver or silver-plate, this particular one has undoubtedly created as much interest and become as widely sold as any which have made its appearance in recent times. Such a condition has been brought about by the fact that the designs of the ware are paramount to the alloy and nothing appears to be claimed for the latter except that it is solid metal which will not tarnish.

It is not the function of this journal to laud the wares of manufacturers, and it is not my intention in writing this article to lead the reader to believe it was written for such a purpose. Coming as it has, however, this metal has created so much interest as to its actual composition that the time appeared ripe to pry into the mysteries of the material, if they could be so called.

Let me begin with the name about which there is a widely spread erroneous opinion. The material is made in Berlin, Germany, by parties named Kayser. Zinn is the German word for tin, so that Kayserzinn is in reality Kaysertin. Many assume that Kayser is the same as Kaiser, and as the latter means emperor, the name Kayserzinn is supposed to mean imperial tin.

Upon first sight the beauty of the designs is the first to attract one's attention. On this point credit should be placed where it is due, and I will say that whoever designed the various wares which have been put on the American market certainly is an artist. Everywhere, from the purchaser who buys from a purely artistic standpoint and for use or ornament, to the silversmiths who purchase in order to compare with their own wares and designs, I hear nothing but praise for the designer. I will frankly confess that I have never heard one dissenting voice from even the competitor (if our silversmiths may be so called), and I regret that it will be so, but I am sure that these beautiful designs will have their direct effect on the flat and hollow-ware trade. Kayserzinn will undoubtedly furnish "food for reflection" for the American designer and the result will soon be manifested in the new designs of silverware which are constantly appearing. How these designs were evolved is not within the province of our journal, but it is quite apparent that Nature played a part in the evolution of the work. It is my belief that those designs in which Nature is made to play her part can never be excelled and they form our most beautiful designs known to the art. That designs are paramount to the material is indicated in the instance of the same alloy being sold on the market in different patterns from those of Kayserzinn. Such material has been sold by several of the large hollow-ware manufacturers, but has met with little enthusiasm, not because the alloy is not identical, for it is, but the designs are not so pleasing as those of the original metal. There is little doubt that, had the designs of Kayserzinn been unattractive, the alloy would not have taken on the American market.

The policy of the makers appears to be correct. Cheap material that it is, they have not attempted to sell it at a reasonable figure, as this would indicate the inferiority of the material, but have placed a high price upon it; so high, in fact, that the metal is really quite expensive to purchase. The small mustard cup shown in the photograph sells at retail for $2.50, while the ash tray brings $2.25. By carrying out this policy, the makers lead one to believe that the metal contains some precious metal. From a business standpoint this is unquestionably good policy, as a cheap price would certainly react unfavorably in the opinion of the goods.

Some pieces of the material were recently purchased on the open market and subjected to chemical analysis. The results were as follows, viz:

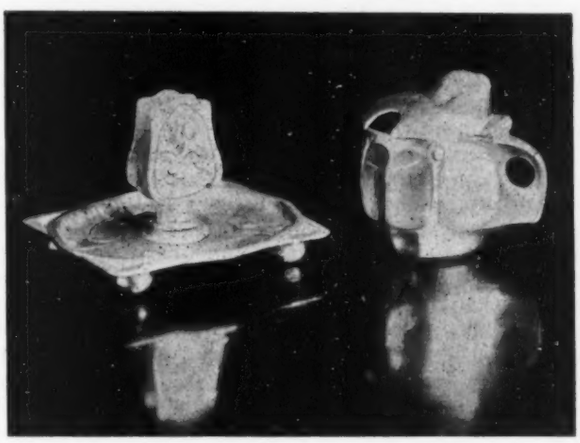
Tin	92.98 per cent.
Antimony	5.44 per cent.
Copper	1.58 per cent.
Lead	None
Silver	None

In composition, then, Kayserzinn is simply Britannia metal in almost exactly the same proportions that are used in the United States for the production of this alloy. The leading maker of Britannia ware uses the following composition for casting, viz:

Tin	210 lbs. =	92.8 per cent.
Antimony	12 lbs. =	5.4 per cent.
Copper	4 lbs. =	1.8 per cent.

No difference, therefore, exists between Kayserzinn and Britannia metal. In this connection it may be said that the composition of the ware which the American concerns have put on the market in competition with Kayserzinn have been of the above proportions, so that it may readily be appreciated that the design is the chief feature.

In appearance Kayserzinn does not have that dazzling whiteness so common on plated tinwares. To be sure, the slightest admixture of antimony and copper darkens



SAMPLES OF KAYSERZINN.

the color to a slight extent, but the shine and glitter is removed by means of pumice. Herein the makers have again used artistic taste as a matte finish has already become popular. The surface has the appearance of the French gray finish, described in the June issue of The Metal Industry.

A close inspection reveals the fact that tin is the chief component of the alloy, as the odor and the familiar tin-cry readily demonstrate it. The alloy is stiff enough for all purposes and will bend considerably without fracture. The proportions of tin, antimony and copper in the alloy are well balanced for this purpose. More increases the hardness, so that the alloy will be brittle, and less renders it easily bent out of shape.

Photographs of a mustard cup and ash tray are here-

with reproduced and indicate the character of the material.

The Kayserzinn articles are cast in metal molds in the same manner that Britannia and other soft metals are in the United States. Soldering with soft solder is resorted to when required to fasten several pieces together that cannot be made in one mold. The majority of pieces, however, are cast in one piece. Much handwork appears to have been put on the articles in the way of scraping and smoothing down to a finish. The alloy is sufficiently hard, so that it possesses more or less resonance.

While there is no patent on this alloy, the name or trade mark is undoubtedly registered, so that the goods cannot be made by other parties under the name of Kayserzinn.

If lacquer in drying gives an iridescent appearance to the work, it is an indication that too much "thinner" has been used. Lacquer to be satisfactory needs to be of the proper consistency. If too thick, waves and drops form on the work; if too thin, the iridescent film so often noticed on cheap work is produced.

Six sailors of the S. S. Toronto were recently made delirious, and are now in a serious condition, by the bursting of two casks of fusel oil on shipboard. The ship recently arrived in New York from England, was having its cargo unloaded, when the casks burst. Inasmuch as fusel oil is used to a large extent in the manufacture and use of lacquer, this information indicates the injurious nature of the fumes, a danger not generally appreciated.

PECULIARITY OF A NICKEL ANODE.

Editor of THE METAL INDUSTRY:

In your July issue you described a peculiarity in the behavior of a nickel anode. This was of interest to me, inasmuch as some of the observations which have been made in my laboratory bear a striking resemblance to the phenomenon which you illustrate.

It has been observed that in several instances the surface of the metal anode was uncorroded, while the metal beneath was removed, resulting in considerable portions of the surface becoming detached. The cause of this was ascribed to the fact that, at some time previously, the anode plate had been used as a cathode and had received a deposit of pure nickel. Upon subsequently replacing it on the anode bar, the pure nickel surface remained uncorroded, while the more impure nickel beneath was eaten away.

I do not know that this is an explanation of the particular case which you describe, but it strikes me as being a possibility.

It has also been found that a cast iron anode presents peculiarities of corrosion similar to that of cast nickel anodes and not ascribable to the explanation above suggested. With a current density such as is ordinarily used for electroplating, a cast iron anode will corrode exclusively from the surface, but some of the iron will be dissolved out to a considerable depth, leaving the surface apparently unattacked. It is found, however, that the mass is quite porous, a considerable portion of the iron having been dissolved out. On allowing the anode to dry, large flakes of considerable area may be separated from the anode surface, and on breaking this up, a magnet attracts the material. A chemical analysis showed that the material was a mixture of metallic iron and graphite.

C. F. BURGESS, E. E.
Electrochemical Laboratory, University of Wisconsin.

BURNISHING NICKEL PLATE.

BY J. W. FORCE, NEW BRITAIN, CONN.

There is much benefit to be derived from the burnishing of small nickel-plated articles when they are capable of being treated rapidly on a hand lathe. I have been doing this for several years, and prefer it to buffing, and have not experienced any difficulty in getting good results. As to the benefits, I will say that the articles may be burnished more rapidly than they can be buffed, and the finish is more lasting and durable. In buffing, a certain amount of the plate is taken off, while in burnishing nothing is removed, but the surface is hardened under the burnishing tool. In some lines of work cleanliness is a great feature, as in burnishing no adhering particles of rouge remain which require washing off.

I have been using the burnishing process for buttons, and some 1,200 gross are treated every day. To accomplish the result, however, the solution must be properly made and maintained. The coating also must be very light; only just enough to cover the article should be put on. I use a solution which does not stand over 5 degrees hydrometer test, and even a little less is better than over.

The method which I use is as follows, viz.: The articles to be plated are first sent to the dipping department and dipped in the usual brass dip until a good, bright, clean finish is produced. They are then rinsed in cold water, then in hot water, and afterwards dried in sawdust. They are now sent to the plating department. The articles are now placed in baskets, rinsed in potash solution, and then in cyanide solution. The next operation is to rinse thoroughly in three waters and place in plating baskets in the plating bath. The plating is allowed to continue until a light coating is produced. They are then thoroughly rinsed in cold water, then in hot water, and dried in sawdust and afterwards sent to the burnishing department. The burnishing is accomplished with the ordinary suds and burnisher.

The dynamo which I use is a 6-volt machine, and serves four tanks of 125 gallons each. The voltage is 1¼ at each tank. The solution stands at 5, hydrometer test, and carries two ounces of boracic acid to the gallon. I always keep the solution acid, as in an alkaline solution no benefit would be obtained from the boracic acid. An alkaline solution has a tendency to make the deposit dark and cloudy and also tarnish the brass articles when they are put into the bath, thus preventing the plate from adhering.

The measure of success lies in the obtaining of a thin, even, adhering deposit, which, when the burnisher strikes it, is forced into the pores of the metal. A hard, bright and clean finish is so produced, but if a rough plate is produced it will strip under the burnisher. After the articles are burnished they are rinsed in hot water and dried in sawdust.

In plating, the articles must be taken from the solution every few minutes and shaken, so as to displace them and allow any contact parts to become evenly covered. I usually get a good burnishing deposit in from fifteen to twenty minutes. This, of course, applies to small goods that are plated in baskets, and my experience in burnishing nickel-plate has been confined to this class of goods. In plating shears, the same rule applies in regard to the even coating. A thick deposit will strip or peel when ground after plating, but if the plate is light and thin the nickel is ground from the edge in minute particles, which do not adhere to one another sufficiently to make a perceptible stripped or peeled surface.

DIRECTIONS FOR CASTING MANGANESE BRONZE

As manganese bronze contains nearly one-half its weight of spelter and likewise some aluminum, it is quite a difficult metal to cast. If treated like ordinary brass or bronze poor results always follow. The following directions will, no doubt, aid the foundryman in obtaining better work than is customary:

Manganese bronze should, when practicable, be cast in dry sand. Green sand may, of course, be used, but better results are obtained if the mold has been dried. This, of course, applies equally as well to other metals.

Wherever possible, the metal should be melted in crucibles, but of course large castings must be made by melting the metal in a reverberatory or similar furnace. The melted metal must be kept well covered with charcoal from the beginning and must not be allowed to become hot or "burned." Manganese bronze cannot be melted in a cupola.

The metal should be poured as hot as possible as long as it does not produce a rough skin on the casting. Thoroughly skim before pouring.

In melting, heat until the zinc fumes begin to come off freely, remove from fire and pour as soon as the undisturbed surface does not flare. The zinc should flare freely when the metal is being poured into the mold.

The dross, slag and charcoal which are liable to enter the casting may be kept back by the use of a skim gate (described in our journal) and as an auxiliary a deep basin may be formed around the runner. The runner is plugged until the basin is partly full and is then opened. Continual pouring in the basin will keep it full and allow the dross etc., to float to the top. The basin should not be allowed to become empty at any time during the pouring or the dross will enter the mold.

The runners should be as few as possible and of good size. They should enter the casting at the bottom so as to avoid splashing as the metal drops into the mold. The more the metal is agitated the larger the amount of dross and with the attending dirtiness in the casting. A horn gate must be employed if the most perfect work is desired. This gate is shown in the following sketch and indicates the principle of gating the casting. Never allow a runner to enter the top of the mold, as it is sure to make dross.

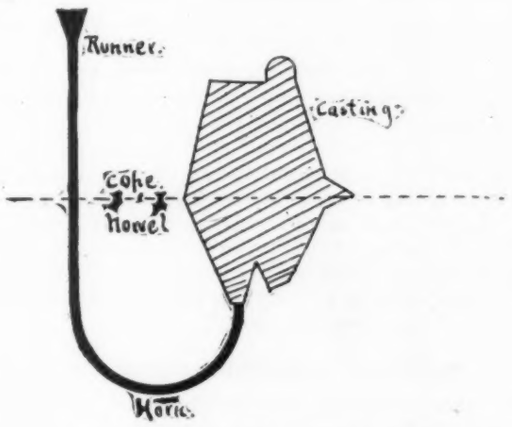


FIG. 1—CASTING MANGANESE BRONZE.

Manganese bronze shrinks much more than ordinary bronze and large risers or feeders must be used on the heavy portions. Great diversity of beliefs exist in regard to risers and the majority are erroneous. The idea of a riser is to feed the casting with liquid metal as the cooling takes place, and bulk, therefore, is the fundamental desideratum. The neck of each riser must have sufficient bulk to prevent its cooling while feeding. A bulky, thick riser is imperative and the height is of secondary importance, although a high riser, by putting a pressure on the casting, gives solidity and freedom from blow holes. No amount of height, however, without the requisite bulk, will answer the purpose of feeding. The following drawing will illustrate this point.

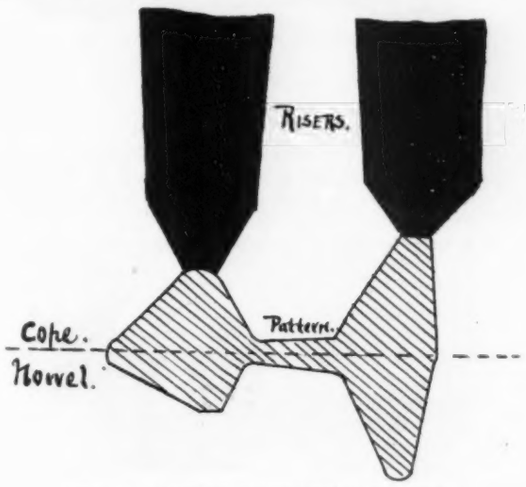


FIG. 2—CASTING MANGANESE BRONZE.

Attach all risers to the top of the thickest parts of the castings. Risers on the thin parts are of no use. Make the necks as thick as posible. Do not be too careful about the difficulty in cutting off; a hack saw will do quick work, and the time so spent is of little importance compared with a sound casting. The diameter of the riser should be about twice the diameter of the part that it is intended to feed. If the casting has many isolated or irregular portions, each part must be fed by a riser. Feed the risers with rods as long as possible and add hot metal to them, so as to avoid their being chilled.

Attach the runner to the lowest part of the casting. Make it a rule to have the metal flow up instead of down. This is an invariable rule.

Cast all working surfaces down when possible and patterns should be made with this intention, but if unavoidable, extra material must be left for machining. Cylinders, pipes and similar work should be cast in a vertical position and long thin pieces are cast edgewise.

Do not think that any pattern will give good results, but make them with the intention of casting in manganese bronze and take into consideration the peculiarities of the metal.

Each time the metal is melted in crucibles add 1½ pounds of zinc to make up for the loss. If in reverberatory or similar furnaces add 4 pounds for each 100 pounds of metal melted. These figures represent the waste in good practice.

The "Zinc City" is a name given to Beira, in Portuguese East Africa. All the houses, barracks and storehouses are built of zinc. Thousands of pounds of zinc have been used in its production. This city is of the mushroom type, and why zinc should have been used for the purpose of building is clear. Wood in the hot and damp tropical climates soon falls the prey of insects or rots, so that the necessity for metal of some kind is apparent.

A PIPE WRENCH FOR POLISHED TUBING.

The increasing use of polished brass and nickel-plated tubing has called for some tool which would grip the pipe without scratching or injuring it in any way. The Warnock Manufacturing Company, of Worcester, Mass., has recently brought out a pipe wrench for this class of work, which is a radical departure from anything heretofore used.

FIG. 1.

The principle lies in the employment of a linen strap, which binds the pipe, and while a tight grip is secured, the surface of the metal is not injured in any way. The linen band is coated with resinous material, which pre-

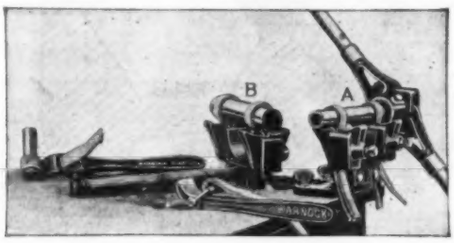


FIG. 2.

vents slipping. In Fig. 1 is shown the ordinary wrench and in Fig. 2 a vise for holding tubing while being threaded. Every worker who desires to make a finished job should be interested.

SELIUM.

A new metal, called "Selium," has been discovered by Edward Mollard, a Frenchman. The discoverer states that it costs only one-twelfth as much as aluminum and is lighter and stronger. It is said to take a polish like nickel and to be adapted for cooking utensils. Its hardness is inferior to that of iron, but greater than zinc.

The report savors of the heralding of a new aluminum alloy and not the discovery of a new element, as one might imagine. The use of magnesium is receiving much attention in alloys and the probabilities are that this element enters into the composition of the so-called "Selium."

AMERICAN ELECTRO-CHEMICAL SOCIETY.

The fourth general meeting of the American Electro-Chemical Society will be held at Niagara Falls, N. Y., September 17, 18 and 19, 1903, at the auditorium of the Cataract House. Thursday and Friday afternoons will be devoted to visits to power houses and electro-chemical plants. Thursday evening there will be a smoker and entertainment, Friday evening a dance and reception and on Saturday evening there will be a trip to Niagara-on-the Lake, Youngstown and Port Niagara by boat and trolley. Among the papers which will be read are: "A New Type of Electrolytic Cell," by P. G. Salom; "Electrolytic Copper Refining," by Dr. W. D. Bancroft; "Electrometallurgy of Gold," by Dr. W. H. Walker; "Efficiency of the Nickel Plating Tank," by Prof. O. W. Brown, and other papers are expected from Dr. J. W. Richards, David H. Browne, Dr. L. Kahlenberg, Prof. C. F. Burgess and A. H. Cowles.

THE PRODUCTION OF ALUMINUM.

A pamphlet issued by the U. S. Geological Survey on "The Production of Aluminum and Bauxite in 1902," by Joseph Struthers, gives many interesting facts about the aluminum industry. We make the following abstract:

"The production of aluminum in the United States during 1902 was approximately 7,300,000 pounds as compared with 7,150,000 pounds in 1901, an increase of 150,000 pounds. An international agreement between all of the aluminum producers has been drawn up and the price of ingot aluminum fixed for 1903. There are in the world at the present time five companies that produce aluminum at plants at nine locations, the details of their equipment being given in the subjoined table:

Aluminum works in Europe and America, 1902.

Name of company.	Locality of works.	Horsepower. Available.	Horsepower. In use.	Process.	Capital.
The Pittsburg Reduction Co.	Niagara Falls		11,000	Hall	$1,600,000
Do	do			do	
Do. (Royal Aluminum Co.)	Shawinigan Falls	6,000	5,000	do	
The British Aluminium Co.	Foyers	14,000	8,000	Heroult	3,360,000
Société Electro-Metallurgique Française.	Le Praz	12,800	8,000	do	2,880,000
Compagnie des Produits Chimiques d'Alais.	St. Michel	6,000	2,000	Hall & Minet	
Société Anonyme pour l'Industrie de l'Aluminium.	Neuhausen	4,000	4,000	Heroult	2,677,500
Do	Rheinfelden	5,000	5,000	do	
Do	Lend Gastein	5,000	(a)	do	

a With the exception of the American and Canadian works, all these works manufacture other products in addition to aluminum.

"For several years past the various companies have continued their secretive policy concerning the development of the industry, and practically nothing has been published in regard to modern improvements beyond the descriptions of patents, which have been granted mainly for the purification of bauxite—the chief raw material used in the manufacture of the metal.

"Aluminum is used mainly for the transmission of electric currents, although a large proportion of the output is manufactured into articles for domestic and culinary use. It is also utilized for the construction of parts of machines and apparatus which require lightness rather than great strength, and in the manufacture of special alloys. Two other uses of growing importance are for lithographic work, the metal being used as a substitute for stone and zinc, and for the production of intense heat by the combustion of the metal in powder.

"The use of aluminum as a substitute for uncovered overhead transmission lines is still expanding in the United States, and is one of the most important outlets for the metal produced here. Despite the severe criticism of this use of the light metal, chiefly on account of corrosion, a number of electric light and railway companies have purchased very large quantities for transmission purposes. Corrosion seems more vigorously to attack drawn wires than rods, and a 'weather-proof wire,' coated with a preparation that forms an impervious cover, is now manufactured."

AMERICAN ALUMINUM ASSOCIATION.

The date for holding the convention of the American Aluminum Association has been changed from September 2 and 3 to September 4 and 5, that all members may attend. The first meeting will be held on Friday morning, September 4, at 10 o'clock, at the Murray Hill Hotel. Friday afternoon will be devoted to pleasure seeking. Saturday morning another meeting will be held and in the afternoon there will be an excursion and dinner to one of the seaside beaches. A full attendance is promised of members and those interested in aluminum.

THE HISTORY OF BABBITT METAL.

An erroneous idea appears to prevail in regard to the invention of Babbitt metal, and now that this alloy is so extensively used the time seems opportune for the correction of this belief. Although Isaac Babbitt was the inventor of the method of using soft metals in journal boxes, his patent specification makes no claim on the alloy itself, but simply on the method of holding the soft metal in place. Reference to the copy of the patent specification given below will corroborate this statement.

Isaac Babbitt was born in Taunton, Mass., on July 20, 1779. He learned the trade of goldsmith, and in his native town made the first britannia ware produced in the United States. This took place in 1824. This enterprise proved unsuccessful; he then removed to Boston and entered the employ of the South Boston Iron Works, and in 1839, while an employe of this establishment, he produced the invention which has perpetuated his name. For this invention he was given a gold medal from the Massachusetts Charitable Mechanics' Association, and afterwards Congress granted him the sum of $20,000 as a reward. In 1884 the invention was patented in England and in 1847 in Russia. After devoting some time to the production of metals he engaged in the manufacture of soap, so that his name has become almost a household word. He died insane at the McLean Asylum, Somerville, Mass., on May 26, 1862.

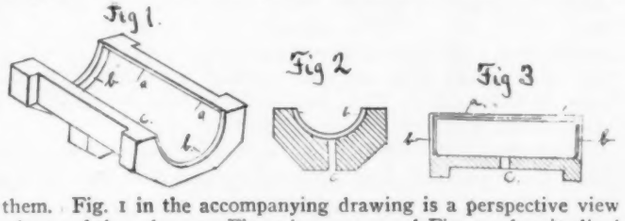
The following is a verbatim copy of the patent specification now out of print, so that printed copies cannot be obtained from the Patent Office:

Isaac Babbitt: Improvement in the mode of making boxes for axles and gudgeons. Specification forming letters patent No. 1,252, dated July 17, 1839.

To all whom it may concern: Be it known that I, Isaac Babbitt. of the city of Boston, in the State of Massachusetts, have invented a new and improved mode of making or constructing the boxes within which the gudgeons or journals of machinery in general, and the axles of railroad cars, locomotive engines and other cars and carriages are to be run by which mode of constructing or making such boxes or bearings, the heating and abrasion of which is apt to occur under the ordinary mode of constructing them are prevented, and their durability is consequently increased; and I do hereby declare that the following is a full and exact description thereof:

I prepare boxes which are to be received into housings or plummer blocks in the ordinary way of forming such boxes; making them of any kind of metal or metallic compound which has sufficient strength and which is capable of being lined. The inner parts of these boxes are to be lined with any of the harder kinds of composition known under the names of Brittania Metal or Pewter, of which block tin is the basis. An excellent compound for this I have prepared by taking 50 parts of tin, 5 of antimony, and 1 of copper. But I do not intend to confine myself to this particular composition.

To prepare the boxes for the reception of this composition, I cast them with projecting rims along their interior edges and on their ends within the semi-cylindrical part which is to receive the axle or gudgeon. I then tin the inner surfaces of said boxes and the ledges or rims above named in order to cause the metallic composition with which they are to be lined or cased to adhere to



them. Fig. 1 in the accompanying drawing is a perspective view of one of these boxes. Fig. 2 is a cross and Fig. 3 a longitudinal section through *a a*, in figures 1 and 3 are the ledges or rims along the edges, and *b b* those around the ends of said box. The use of these is to hold the metallic lining firmly in place and prevent spreading. The lining may be used, however, without such ledges or rims. In finishing one of these boxes I proceed in the following manner:

I coat the outside, including the rims, with tin in the well-known manner of performing that operation. I then take a cylindrical or semi-cylindrical, former of the exact size in its cylindrical part of the gudgeon or axle, which is to run within it, and upon this axle or gudgeon or former, I place my box in such a manner that the axis of the axle or gudgeon, and of the curvature of the box shall coincide, my box being of such size as that when so placed the projecting rims or ledges shall not touch, but shall be nearly in contact with the gudgeon or axle, say within the distance of from 1-16 to a 1-32 part of an inch more or less. I then close these places by any suitable means and it is then prepared to receive the lining of composition metal which is to be melted and poured in.

For the purpose of pouring it in, there is a hole "*c*" left through the middle of the box, which in those for railroad cars may be an inch in diameter and will in all cases be proportioned to the size of the box. The metal thus poured in will take to the tinned surface of the interior of the box and surrounding rims and ledges and will cover the edges of the latter so as to prevent contact between them and the axles or gudgeons which they are to receive, whilst the ledges will effectually check any tendency in the metal to spread from the weight and the friction of the load; when the ledges are not used the coating of composition metal should be but thin. Having thus fully described the nature of my improvement and shown the manner in which I carry the same into operation which I claim as my invention and desire to secure by letters patent is the making of the boxes for axles or gudgeons in the manner above set forth, that is to say by the casing of hard pewter or composition metal of which tin is the basis into said boxes, they being first prepared and provided or not with rims or ledges and coated with tin as herein described and made known. (Signed) ISAAC BABBITT.

Witness
THOS. P. JONES.
LINTON THORNE.

The fact that in the patent specification no claim is made for the alloy is sufficient to dispel the ordinary belief in this direction. Britannia metal, pewter or an alloy of tin 50 parts, antimony 5 parts and copper 1 part are recommended. The latter alloy is somewhat softer than that now known as "Genuine Babbitt," which is commonly composed of tin, 96 parts; antimony, 8 parts, and copper, 4 parts. The original idea in the use of a soft metal was practically the same as it is now, i.e., to make a bearing which would conform to the surface of the axle. It is natural then that the alloys used to-day are somewhat harder than the original material employed. It is also natural that the name Isaac Babbitt should have been handed down to posterity as the inventor of the alloy, although, of course, quite erroneously.

Nickel plating is supposed to have been invented by Dr. Isaac Adams, of Boston, Mass., in 1869, but Gore, the celebrated English authority on electro-metallurgy, states that he himself used the solution which Dr. Adams patented (the double sulphate of nickel and ammonia) as far back as 1855.

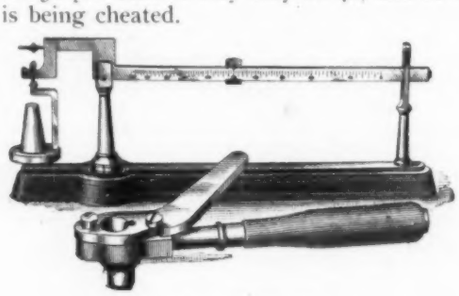
HENRY HANSEN.

We regret to announce the death of Henry Hansen, editor of *The Foundry*. Mr. Hansen was born in Denmark in 1865, and came to this country without friends and with little education. By constant evening study he mastered not only the English language, but the theoretical side of his profession as well. His practical education in the foundry was obtained in the West, and in 1892 he became connected with *The Foundry*, which was started at that time in Detroit. For the past four years it has been practically under his direction. A man of genius and ability, it is to be regretted that he should have passed away in the midst of his success.

SOLDER TESTING SCALES.

Soft solder consists of tin and lead and in varying proportions, depending upon the quality of the work required. The usual proportions are half lead and half tin. This makes an excellent material for all around work. This composition, however, is not suitable for plumbers' wiping solder, as it does not stay plastic at the temperature required. For this latter purpose, therefore, two parts of lead and one of tin are used.

The great disparity in the prices of tin and lead is a temptation to the solder maker to put in more lead than he ought. When one buys half and half and so desires it there is no superficial indication of the amount of tin. Instead of 50 per cent. it may only be 40, and so the purchaser is being cheated.



SOLDER TESTING SCALE.

Herman Kohlbusch has recently brought out a scale for testing solder, which enables the purchaser to test his own. The principle is based on the difference in the specific gravity of tin and lead, so that mixtures of the two obey a certain law. From this it becomes easy to figure the proportions of the ingredients when the specific gravity is known. The scale, in reality, is nothing more than an apparatus for taking the specific gravity, but the beam is graduated for the percentages of tin and lead instead of the specific gravity direct. This avoids the use of any tables and greatly simplifies the operation.

To use the scale all that is necessary to do is to cast the solder in a mold, which is furnished with the scale, and after it has cooled place it in the scale pan, as shown in the illustration. After balancing, the percentage of tin and lead are read off from the beam. Only alloys of lead and tin can be tested, as any other metal renders the results inaccurate.

ROYAL COPPER FINISH ON BRASS.

The royal copper finish, which was described in our February issue, has usually been applied to copper, and the color and lustre so formed is superior to that produced in any other way. It is often desired, however, to apply this finish to brass, German silver, or even iron, and the process may be carried out by first giving the article a copper plate and then treating the surface by means of the lead plating and heating to produce the so-called royal copper finish. After the article has been copper-plated the method is identical with the process which was described in our February issue, to which the reader is referred.

The finish thus produced on brass by the process of first copper-plating and then treating with the lead plate, etc., is far inferior to that formed on pure copper. It lacks the deep red color so pleasing and possesses more of an orange tint, which is not so agreeable. The depth is also lacking, although this may be regulated to a certain extent by adjusting the first copper coating. A thick copper coat gives a deeper finish. For beauty, lustre and depth, however, there is nothing which can equal that produced on pure copper itself.

USE OF COMPOUND OF TUNGSTEN AND LEAD.

Inasmuch as tungsten is not an extremely rare metal and has a very high specific gravity, attempts have been made to employ it in the manufacture of bullets. The fact that up to the advent of the electric furnace it had never been obtained in the coherent state, as it defied all attempts at melting and only existed as powder, precluded its use in this direction. The tungsten, however, which is fused by the heat of the electric arc is hard and brittle and is not suited for use as bullets. Again, it cannot be shaped.

Tungsten (or Wolfram, as it is called in Germany) has a specific gravity of 19.12, while gold is 19.26. It will, therefore, be seen that it is nearly twice as heavy as lead, which has a specific gravity of 11.25. It is quite natural, then, that one should turn his attention to the manufacture of bullets.

Eugene Polte, of Magdeburg-Sudenburg, Germany, has recently brought out a process for utilizing the powdered tungsten, which may be easily obtained. He says that tungsten, except in rare cases, cannot be alloyed with other metals. The melting points of tungsten and lead are so widely separated that to combine them by fusion is practically impossible. He makes an alloy of wolfram and lead in the following manner:

The tungsten is treated to remove the clay, oxide of iron or other foreign matter which it usually contains and is then mixed with finely divided lead in the proportion of 206 parts of lead and 183 of tungsten. The mixture is then made intimate by means of a roller mill or similar appliance and is then subected to hydraulic pressure. In the operation all air must be expelled.

He states that the process is intended for the manufacture of an alloy of tungsten and lead to be used for ammunition. It may, however, he says, be used for other purposes.

ORMOLU DIP OF BRASS.

An ormolu dip for cast or sheet brass may be prepared and used as follows, viz: After the articles have been thoroughly cleaned in a strong solution of potash, they are rinsed in water and immersed in the following mixture. This mixture should be made up and allowed to stand twenty-four hours before using. A stone crock should be used for holding it and must be surrounded with a stream of running water in order to keep the contents cool. Unless the latter is carried out, it is difficult to obtain good results. The mixture consists of, viz:

Yellow aqua fortis (nitric acid)	200 parts
Oil of vitriol (sulphuric acid)	100 parts
Common salt	1 part
Sulphate of zinc	1 to 5 parts

The work should be immersed in this solution from 5 to 25 minutes, according to the amount of matte required. After rinsing in water the work is immersed in the ordinary brass dip (usually composed of 2 parts of oil of vitriol and 1 part of yellow aqua fortis and a small quantity of common salt, say one handful for every five gallons of mixture). This latter dip should be kept in a stone crock and near running water.

Matt dip is a difficult thing to handle and the operator must have patience and be very careful how he handles his work.

For oxidizing silver, a weak solution of chloride of platinum gives much better results than the usual liver of sulphur solution. The color produced is dead black, adheres better, and is much more lasting.

CORRESPONDENCE DEPARTMENT

In this Department we will answer any question relating to the non-ferrous metals and alloys. Address THE METAL INDUSTRY, 61 Beekman St., New York

Q.—A method for making an alloy of 50 per cent. copper and 50 per cent. lead is desired. The founder who has attempted to make this alloy says that he has been unable to obtain it without the lead separating. Combining agents, such as phosphorus, zinc and antimony, were tried, but without success.

A.—An alloy of equal parts of lead and copper is very difficult to make and not have the lead separate. If cast in sand, as it ordinarily is, the slow cooling renders it easy for the lead to settle. Casting in chill molds at as low a temperature as possible will render the operation satisfactory, as the rapid cooling prevents the lead from settling. A homogeneous alloy, however, cannot be made in any manner, as lead and copper do not form one. The best that can be done is to prevent the mass of lead from settling, but in this case the fracture of the casting reveals the lead in small specks intermixed with the copper. They do not seem to alloy.

A slight addition of nickel is employed for the purpose of preventing the settling of the lead. About 1 per cent. is used, but this has been patented by The Ajax Metal Co., and so cannot be used.

Q.—A shipbuilder asks for the best brass mixture for marine dead-lights, or air-ports.

A.—A good mixture, as well as one which is quite cheap, consists of the following ingredients, viz.:

Copper	55.00 per cent.
Zinc	42.00 per cent.
Tin	1.00 per cent.
Lead	1.50 per cent.
Aluminum	.50 per cent.

If too hard, the tin may be left out or reduced in amount. This mixture casts well in sand, but should not be poured too hot. It also stands the corrosive action of sea water well. It is practically the same composition, however, as manganese bronze, and the same rules in melting and casting should apply.

Q.—A correspondent desires to know whether aluminum or copper will be most suitable for a groove for a large plate of glass to slide in. The glass is quite thick, and the metal must have sufficient strength to render the joint air-tight when closed. The metal should be free from corrosion.

A.—Brass would be better for this purpose than either copper or aluminum, as it is much stiffer. Inasmuch as the groove in which the glass is to slide is to be air-tight, much work must be put on the groove to make it so, and either copper or aluminum are not easily worked. We do not know whether it is intended to use a casting or sheet metal, but in either case, if the metal is to be planed, cut or filed, a quality known as leaded brass should be used, as this material works well under the cutting tool.

Q.—A manufacturer wishes to know whether the black finish found on aluminum goods is a lacquer or is oxidized, and whether it can be put on tin.

A.—Aluminum cannot be oxidized like brass, copper or silver, and the finish is produced by a black lacquer. This may be obtained from lacquer manufacturers, and of various grades. The lacquer may be used on tin as well as aluminum.

Q.—A lock manufacturer wishes a method for producing a blue and also a black color on steel articles of a small nature.

A.—We answered this question in our August issue, suggesting the use of a special gas furnace made for the purpose, but if the party desires to make the apparatus himself, the following directions may be followed:

Make a sheet iron cylinder two feet long and ten inches in diameter and place over a charcoal fire at an angle of thirty degrees. The lower end is closed and the upper furnished with a crank. Fill the cylinder about half full of fine, clean sand, such as sea sand, and heat to 500 or 600 degrees, depending upon the color desired. A higher temperature will give a black color.

The small steel articles, clean and highly polished, are placed in the sand and the cylinder slowly revolved until the desired color is obtained.

After the desired color has been obtained, remove the articles with a long-handled scoop made of wire cloth of suitable mesh to catch the work and leave the sand.

If there is too much heat, the blue will change to black, and the articles will have to be repolished if the blue color is necessary. A 10 per cent. solution of muriatic acid will remove the color, if it is so desired.

Steel springs and wire may be blued by reeling rapidly through a lead bath kept at the proper temperature.

Q.—Subscriber wishes to know about the following questions:

1. Can aluminum be plated with either gold or silver?
2. Does it corrode in contact with bitters or acids?
3. Can a fine screw thread be cut on it.

A.—Aluminum can be plated with gold or silver, but requires much adeptness in the art of plating. Great care is necessary, and, we regret to say, has never become an alluring field on account of the tendency of the plate to peel. Practically the same difficulty occurs in soldering. The metals do not appear to thoroughly unite.

Aluminum does not readily corrode in contact with the ordinary fruit acids and similar substances. There is, however, a slight tarnishing, but as the oxide is white, the result is not noticeable.

A fine thread may be cut on aluminum if turpentine is used to lubricate the tool.

Q.—Correspondent has been experimenting with different copper alloys, with the intention of obtaining a metal of high tensile strength. He says that he wishes something which will give a higher strength than manganese bronze, Government specifications for which call for 72,000 pounds per square inch.

A.—Among the common alloys, manganese bronze is undoubtedly the strongest alloy, although it is difficult to always obtain the high tensile strength.

Aluminum brass, composed of copper 63.33 per cent., zinc 33.33 per cent., and aluminum 3.34 per cent., has given over 80,000 pounds per square inch in sand castings (see METAL INDUSTRY, March, 1903), but is more difficult to cast on account of its greater shrinkage.

Undoubtedly the strongest known copper alloy, although not a bronze, is one composed of copper 63.33 per cent., nickel 33.33 per cent. and aluminum 3.34 per cent. From 95,000 to 100,000 pounds per square inch may be obtained in castings.

TRADE NEWS

Frazer's rapping plates and lifters for the protection of patterns are sold by the S. Obermayer Company, of Cincinnati, Ohio.

Mr. H. D. Phelps, of Ansonia, Conn., has taken the foundry of F. L. Gaylord, of the same town, and is operating the Gaylord foundry in connection with his own.

The Victor Metals Company, of East Braintree, Mass., have recently turned out 15,000 sets of a model of the "Reliance" and "Shamrock III," made from its victor metal.

The Pittsburg Meter Company, of East Pittsburg, Pa., manufacturers of all kinds of meters, find that its facilities are not adequate to the demand for its goods and are about to double its capacity.

The American Locomotive Company have recently installed a Dings magnetic separator in their Schenectady works, making four of their several plants now equipped with these machines.

The heads of departments of Sargent & Co., of New Haven, Conn., to the number of forty, enjoyed an elaborate shore dinner on Wednesday, August 12, at Cox's Surf House, near New Haven. The diners had a royal good time and were each presented with a silver-topped stein.

Mr. John H. Pepper, of Philadelphia, Pa., has become general sales agent for the Turner Machine Company, manufacturers of molding machines and automatic cock grinders, with offices at 2049 North Second street, Philadelphia. His mail address is P. O. box 31. Mr. Pepper also sells Charlier melting furnaces and Dings electromagnetic separators.

W. A. Case & Son, of Buffalo, N. Y., manufacturers of steam and water goods for plumbers, as well as lines of brass copper and iron work, have purchased the building occupied by the Jewett Stove Company and will use it for their general manufacturing business. Their Washington street plant, which was burned some time ago, has also been rebuilt.

The United Lead Company have opened offices at 71 Broadway, New York, in the Empire Building, and negotiations are pending for the merging of a number of lead plants into one company. The Executive Committee of the United Lead Company is composed of S. R. Guggenheim, chairman; Daniel Guggenheim, Barton Sewell, E. W. Nash, Morris Guggenheim, Simon Guggenheim and E. R. Hoyt.

The Omega Steel Company, of New Haven, Conn., are making wire dies for drawing the finer sizes of steel from their Omega steel. These are to be used in place of diamond dies, for which there has, heretofore, been no substitute. Cold metal saws for slitting brass, copper and German silver are also made by this company, and as there is no temper to draw, the tools last where ordinary steel will not answer at all. A valuable use for Omega steel has been found in the making of overhauling tools for scraping brass on the Stever machine.

At the annual meeting of the Southington Cutlery Company, of Southington, Conn., C. E. Jennings was elected president.

Several aluminum airships are under construction. Their inventors and builders hope to sail them to the Louisiana Purchase Exposition at St. Louis, 1904.

The Egyptian Lacquer Manufacturing Company, of New York, issues an elaborate catalogue, which describes their transparent and colored lacquers for metal goods.

The Carborundum Company, of Niagara Falls, N. Y., are about to erect a new building of brick and iron for their mixing and furnace department. The building will be of iron and brick and three stories high.

The American Pin Company, of Waterbury, Conn., have now equipped its new brass foundry. It now has an excellent instalment, with a building 160x62 feet and one story high.

The Milwaukee Ornamental Brass Company have recently put a new metal bushing on the market which they call "nickel bronze." The metal is considerably lighter than brass, costs less per pound and is said to have excellent wearing qualities.

The Gilbert & Bennett Manufacturing Company, of Georgetown, Conn., wire manufacturers, have decided to abandon its old New York office, at 44 Cliff street, and will remove to Broadway Chambers, at 277 Broadway. No stock will be carried as heretofore in New York.

The Coe Brass Company, of Torrington, Conn., have placed orders with the Allis-Chalmers Company for two new engines, one 22x44x42 inches and the other 19x38x42 inches. The engines are to be of the well-known Reynolds-Corliss type.

William J. Bruff was recently elected president of the Union Metallic Cartridge Company, of Bridgeport, Conn., to succeed the late Marcellus Hartley. Mr. Bruff is the general manager of the company and has been connected with it for thirty years. For twelve years he was vice-president of the Union Metallic Cartridge Company.

The Lanyon Zinc Company, whose works are at Iola and La Harpe, Kan., will have a zinc rod mill in operation by September 5. The company are also putting in their own grinding machinery. Heretofore their zinc sheets have been ground by outside concerns. The company are selling considerable sheet zinc for electrical purposes. Mr. D. D. Smith, their Eastern sales agent, has returned recently to New York from a two weeks' visit to the company's works.

The Sessions Foundry Company, of Bristol, Conn., have engaged the services of Charles F. Kenworthy, of Waterbury, Conn., who was formerly in the employ of the Benedict & Burnham Company, and are now prepared to build furnaces for the brass trade. It has already received orders from Naugatuck Valley mills for the erection of annealing furnaces. Mr. Kenworthy was formerly in the employ of the Rockwell Engineering Company, and his experience, with the facilities of the Sessions Company, will result to the advantage of the Naugatuck Valley mills.

TRADE NEWS

The New York Insulated Wire Company, of Wallingford, Conn., are completing the erection of a four-story addition to their works. The building is 60x100 feet.

A very handy machine for the brass founder and metal worker is the band sprue saw, put on the market by The Brass Founders' Supply Company, of Newark, N. J.

The Freeport Brass Foundry, of Freeport, Ill., make a specialty of high-grade aluminum castings, and write that they are well equipped to look after the Western trade.

The Clinton Wire Cloth Company, of Clinton, Mass., are about to erect a building for the purpose of electric welding. A new power plant will also be built.

The Consolidated Buckle and Metal Goods Company, of New York, write us that they manufacture a high quality of chains in aluminum and brass.

The Miller Lock Company, of Philadelphia, have recently installed some new machinery in their metal working department in order to meet the demands of their increasing business.

The New England Brazing Company have been organized for the purpose of brazing cast iron and other metals. The spokes of a 22-ton flywheel were recently brazed and it is now running successfully.

The Morgan Construction Company, of Worcester, Mass., have recently furnished one of their continuous rod mills, together with furnaces and other auxiliary equipment, to J. Moulton, of Paris, France, manufacturer of steel and wire.

The Edna Smelting and Refining Company have erected a new shop at Cincinnati, O., for the purpose of manufacturing valves and other steam goods. A new babbitt metal and spelter department has been started and an equipment of oil furnaces installed. Other additions are contemplated.

The Waltham Emery Wheel Company, of Waltham, Mass., write us that the report that it was to remove its plant to Worcester is incorrect. The president says that they have not thought of moving its works anywhere. This company manufacture emery and corundum wheels, including the Richardson wheels, for fine work.

On August 21, while three employees of the Eagle Smelting Works, of New York, were putting old lead pipe into a kettle full of the same metal, a terrific explosion occurred, severely injuring the men, one of them fatally. A bomb is said to have been in the junk, but similar occurrences have happened in other places where lead pipe was being melted. This material invariably contains water, and as the ends of the pipe are often hammered together, it really does become a veritable bomb, but not of the character supposed.

Metallic phosphoro, a flux for brass founders, is made by The New Era Manufacturing Company, of Kalamazoo, Michigan.

The Allis-Chalmers Company, of Milwaukee, Wis., has just completed improvements and extensions in their brass foundry department at their Milwaukee plant.

The labor trouble in the brass working trade at Milwaukee, Wis., is still unsettled, but thus far strike methods have only extended to one concern.

The Monarch Brass Company, of Cleveland, Ohio, are distributing a print giving a bird's-eye view of their plant, which covers the greater portion of a city block. The company manufacture plumbers' brass goods.

The Amalgamated Copper Company is reported to have absorbed the Greene Consolidated Copper Company. The latter company has developed into a formidable competitor, and Naugatuck Valley capital is interested to a large extent in the enterprise.

The Fletcher Aluminum Novelty Company, of Springfield, Mass., are the successors of The Fletcher Aluminum Company and The C. W. Hutchins Manufacturing Company, both of Springfield. The new company will make a specialty of advertising novelties and signs. A specialty of the Hutchins Company was printing on aluminum, and their high-class prints will be maintained by The Aluminum Novelty Company at their shop, 293 Main street, Springfield, Mass.

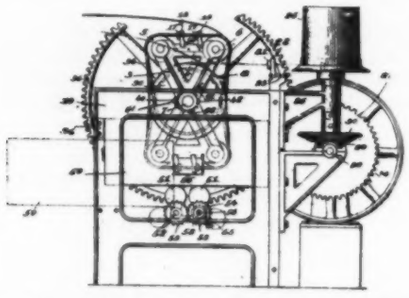
The New Jersey Aluminum Company, of Newark, N. J., are already making several new calendars for 1904. A new thing just designed by the company is a pool rack, which is triangular in form, the same as the ordinary wooden rack used for placing balls on a pool table. The idea of the rack is that it cannot be moved without pressing a button, registering each game which is played. The device is intended to stop disputes which often arise in pool and billiards about the number of games which have been played. Another device of the New Jersey Company is a pipe with an aluminum lining, invented by Henry M. Willis, of East Williston, L. I. It is a simple device for keeping a pipe free from nicotine and assures the user a nice clean smoke at all times.

The Indian Aluminum Company, of Madras, India, have perfected an aluminum razor strop. The company say that a hone of aluminum puts a finer and more lasting edge on a razor than any other sharpening material, and that the officers of their company and several of their friends have used the aluminum strops for over six months, and have found that with ordinary shaving soap the razor is kept in good condition with slight stropping. The fine edge can even be kept on the razor without the use of soap in shaving. The strops are made in a similar shape to those of ordinary leather, and they sell for two shillings or upward, according to the pattern. The Indian Company also use aluminum hones in their shops for putting a fine edge on tools.

PATENTS

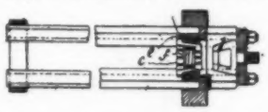
A full copy of any Patent mentioned will be furnished for Ten Cents. Address THE METAL INDUSTRY, 61 Beekman Street, New York.

733,072. July 7, 1903. WIRE-DRAWING MACHINE. Daniel J. McMahon, Taunton, Mass.—In a wire-drawing machine, a draw-



ing drum, a die carrying frame mounted to be swung about the axis of the drum as a center and into any predetermined angular position either side of the vertical diameter of the drum, and a plurality of dies carried by said frame, the construction being such that by placing the frame in any desired position in its path of movement the effective drawing surface on the drum may be regulated.

732,960. July 7, 1903. DIE FOR THE MANUFACTURE OF METAL TUBES OR PIPES. Jacques Reimann, Plasmarl, near Swansea, Eng-

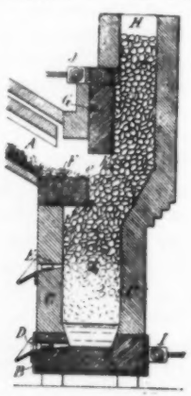


land.—A die for the manufacture of conical bodies, comprising a die plate, an expansible die ring therein, wedges adapted to hold said ring within the plate, and means to move said wedges through the die to permit the expansion of the ring.

733,313. July 7, 1903. COLLAPSIBLE CORE FOR MOLDS. Augustus S. Cramer, Coopersville, Mich.—The combination of two side

plates having oppositely inclined portions near their vertical edges, a middle plate, a rigid support connecting one side plate to the middle plate, a sliding support connecting the other side plate to the middle plate, end plates having inclined portions slidably engaging the edges of the side plates, and means for radially adjusting the end plates.

733,040. July 7, 1903. ELECTRIC FURNACE. Paul L. T. Heroult, La Praz, France.—An electric furnace comprising a well of re-

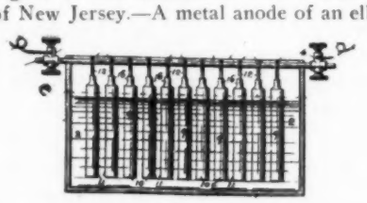


fractory material in which is effected reduction of ore, means for introducing ore into the furnace at a temperature so high as to bring it to at least a pasty condition, an electric terminal in the form of a carbon crucible at the bottom of the furnace, and a terminal in the form of a carbon block at the top, a passage being provided for the supply and maintenance of a column of coke or like fuel between said terminals, the electric current being conducted to the crucible and to the block above, and passing through the coke which fills the well of the furnace below the upper block, the fuel thus constituting a real electrode which is used up as the reduction of the ore goes on, this flowing electrode being constantly fed with fuel introduced through said passage.

733,662. July 14, 1903. SOLDERING OF ALUMINUM. Hjalmar Lange, Vesteras, Sweden.—The process of soldering aluminum which consists in mechanically cleaning the surfaces, heating the same, covering said surfaces with a layer of molten zinc, then covering the zinc-coated surface with a layer of molten aluminum-zinc alloy, and then finally holding said surfaces in contact while subjected to sufficient heat to melt the alloy.

733,028. July 7, 1903. ELECTROLYTICALLY COATING IRON WITH ZINC. Emanuel Goldberg, Moscow, Russia.—The process of electrolytically coating iron, which consists in passing an electric current through the iron as a cathode in the presence of a zinc anode and an electrolyte containing a compound having nitrogen bound to an organic radical.

733,602. July 14, 1903. METAL ANODE. Harry E. Starrett, Chicago, Ill., assignor to the Hanson & Van Winkle Company, a Corporation of New Jersey.—A metal anode of an elliptical cross-



section having a comparatively flat but convex curvature adapted to be placed opposite a cathode to compensate for the otherwise greater flow of current at the edges of the anode, substantially as and for the purposes set forth.

736,712, Aug. 18, 1903. SOLDER FOR ALUMINUM.—Ricardo Fortun and Eduardo Semprun, Madrid, Spain. The industrial product composed of an alloy of determined proportion of copper, silver, bismuth, antimony, tin and aluminum, sulfureted and arsenicated, substantially as described.

736,812, Aug. 18, 1903. SOLDER.—Rudolf Bormann, Berlin, Germany. A liquid soft-soldering mass, consisting of a mixture of a finely pulverized soft-solder metal, triturated to a paste and a deoxidizing agent, together with a thickening substance, which burns without leaving any trace behind it, substantially as specified. The composition of matter consisting of finely pulverized tin, triturated to a paste, zinc chloride and cellulose.

735,158, Aug. 4, 1903. MOLDER'S SPONGE.—Albert G. Schmidt, Springfield, Ohio. In an article of manufacture, a pointed coni-

cal absorbent body of such dimensions as to render it capable of delivering liquid in a fine stream to a particular spot in a sand mold.

Metal Prices, September 1, 1903

METALS

	Price per lb.
TIN—Duty Free.	
Straits of Malaca	27.12½
COPPER, PIG, BAR AND INGOT AND OLD COPPER—Duty Free. Manufactured 2½c. per lb.	
Lake	13.75
Electrolytic	13.62½
Casting	13.12½
SPELTER—Duty 1c. per lb.	
Western	6.00
LEAD—Duty Pigs, Bars and Old 2⅛c. per lb.; pipe and sheets 2½c. per lb.	
Pig Lead	4.15
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.	
Small lots	37.00
100 lb. lots	35.00
1,000 lb. lots	34.00
Ton lots	33.00
ANTIMONY—Duty ¾c. per lb.	
Cooksons	7.37½
Hallets	6.75
Other	6.40
NICKEL—Duty 6c. per lb.	
Large lots	40 to 50
Small lots	50 to 60
BISMUTH—Duty Free	$1.50 to $2.00
PHOSPHORUS—Duty 18c. per lb.	
Large lots	45
Small lots	65 to 75
	Price per oz.
SILVER—Duty Free—Commercial Bars	$0.58
PLATINUM—Duty Free	19.00
GOLD—Duty Free	20.00
QUICKSILVER—Duty 7c. per lb. Price per Flask	47.50

Sheet Lead, 7¾c. per lb., 20 per cent. off.
Lead Pipe, 6¾c. per lb., 20 per cent. off.
Zinc—Duty, Sheet, 2c. per lb.; 600-lb. casks, 7.50c. per lb., open, 8c. per lb.
Tobin Bronze—Rods, Unfinished, 19c.
Tobin Bronze—Rods, Finished, 20c.

PRICE FOR ALUMINUM BRONZE INGOTS.

	Per pound.
2½ per cent	19c.
5 per cent	19½c.
7½ per cent	20½c.
10 per cent	21½c.

Manganese Bronze, Ingots	16½c.
Phosphor Bronze, Ingots	15 to 18c.
Silicon-Copper, Ingots	34 to 36c.

OLD METALS

	Buying.	Selling.
Heavy Cut Copper	12.00c.	12.75c.
Copper Wire	11.50c.	12.50c.
Light Copper	10.00c.	10.75c.
Heavy Mach. Comp	10.65c.	11.75c.
Heavy Brass	7.75c.	8.75c.
Light Brass	6.00c.	6.50c.
No. 1 Yellow Brass Turnings	7.25c.	8.00c.
No. 1 Comp. Turnings	9.25c.	10.00c.
Heavy Lead	3.75c.	3.90c.
Zinc Scrap	4.12½c.	4.37½c.
Scrap Aluminum, sheet, pure	22.00c.	25.00c.
Scrap Aluminum, cast, alloyed	16.00c.	20.00c.
Old Nickel	15.00c.	25.00c.

PRICES OF SHEET COPPER

SIZES OF SHEETS.		96oz. & over 75 lb. sheet 30x60 and heavier	64oz. to 96oz. 50 to 75 lb. sheet 30x60	32oz. to 64oz. 25 to 50 lb. sheet 30x60	24oz. to 32oz. 18¾ to 25 lb. sheet 30x60	16oz. to 24oz. 12½ to 18¾ lb. sheet 30x60	14oz. and 15oz. 11 to 12½ lb sheet 30x60
		CENTS PER POUND.					
Not wider than 30 ins.	Not longer than 72 ins.	20	21	21	21	21	22
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	21	21	22
	Longer than 96 ins.	20	21	21	21	21	23
Wider than 30 ins. but not wider than 36 ins.	Not longer than 72 ins.	20	21	21	21	21	23
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	21	21	23
	Longer than 96 ins. Not longer than 120 ins.	20	21	21	21	22	24
	Longer than 120 ins	20	21	21	22	23	
Wider than 36 ins. but not wider than 48 ins.	Not longer than 72 ins.	20	21	21	22	23	25
	Longer than 72 ins Not longer than 96 ins.	20	21	21	22	24	26
	Longer than 96 ins Not longer than 120 ins.	20	21	21	23	25	29
	Longer than 120 ins.	20	21	22	24	27	
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 ins.	20	21	21	22	24	27
	Longer than 72 ins. Not longer than 96 ins.	20	21	21	23	25	30
	Longer than 96 ins. Not longer than 120 ins.	20	21	22	24	27	
	Longer than 120 ins	21	22	23	25	29	
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 ins.	20	21	22	24	29	
	Longer than 96 ins. Not longer than 120 ins.	20	21	23	26	31	
	Longer than 120 ins.	21	22	24	29		
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 ins.	21	22	24	27		
	Longer than 96 ins. Not longer than 120 ins.	22	23	25	28		
	Longer than 120 ins.	23	24	26	30		
Wider than 108 ins.	Not longer than 132 ins.	24	25	27			
	Longer than 132 ins.	25	26	29			

Rolled Round Copper, ⅜ inch diameter or over, 21 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)

Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.

All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, wider than 17 inches, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planished Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side, 2½c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

Metal Prices, September 1, 1903

COPPER BOTTOMS, PITS AND FLATS

Net Cash Prices.

14 oz. to square foot, and heavier, per lb.	25c.
12 oz. and up to 14 oz. to square foot, per lb.	26c.
10 oz. and up to 12 oz.	28c.
Lighter than 10 oz.	31c.

Circles less than 8 in diam., 2c. per lb. additional.
Circles over 13 in. diam., are not classed as Copper Bottoms.
Polished Copper Bottoms and Flats, 1c. per lb. extra.

PRICE LIST FOR ROLL AND SHEET BRASS

Prices are for 100 lbs. or more of sheet metal in one order.
Brown & Sharpe's Gauge the Standard.

Common High Brass	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Wider than and including	2 12	12 14	14 16	16 18	18 20	20 22	22 24	24 26	26 28	28 30
To No. 20 inclusive..	.22	.23	.25	.27	.29	.31	.33	.36	.39	.42
Nos. 21, 22, 23 and 24	.22	.24	.26	.28	.30	.32	.34	.37	.40	.43
Nos. 25 and 26.....	.23	.24½	.27	.29	.31	.33	.35	.38	.41	.44
Nos. 27 and 28.....	.23	.25	.28	.30	.32	.34	.36	.39	.42	.45

Add ½ cent per lb. additional for each number thinner than Nos. 28 to 38, inclusive.

Add 7 cents per lb. for sheets cut to particular lengths, not sawed, of proportionate width.

Add for polishing on one side, 40 cents per square foot; on both sides, double this price.

Brazing, Spinning and Spring Brass, 1 cent more than Common High Brass.

Extra Quality Brazing, Spinning and Spring Brass, 2 cents more than Common High Brass.

Low Brass, 4 cents per lb. more than Common High Brass.

Gilding, Rich Gold Medal and Bronze, 7 cents per lb. more than Common High Brass.

Discount from List, 30 per cent.

PRICE LIST FOR BRASS AND COPPER WIRE

BROWN & SHARPE'S GAUGE THE STANDARD.	Com. High Brass	Low Brass	Gilding Bronze and Copper
All Nos. to No. 10, Inc.	$0.23	$0.27	$0.31
Above No. 10 to No. 16.	.23½	.27½	.31½
Nos. 17 and 18	.24	.28	.32
" 19 and 20	.25	.29	.33
No. 21	.26	.30	.34
" 22	.27	.31	.35
" 23	.28	.32	.36
" 24	.30	.34	.38

Discount, Brass Wire, 30 per cent.; Copper Wire, 40 per cent.

PRICES FOR SEAMLESS BRASS TUBING

From 2 in. to 3¼ in. O. D. Nos. 4 to 12 Stubs Gauge, 19c. per lb. Seamless Copper Tubing, 22c. per lb.

For other sizes see Manufacturer's List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	33	29	20	19	18	18	18	18	18	18	18	20	20	22	24	25

BRAZED BRASS TUBING

Brown & Sharpe's Gauge the Standard.

												Per lb.
Plain	Round	Tube,	¾	in.	up	to	2	in.,	to No.	19,	inc.	$0 35
"	"	"	⅞	"	"		3¼	"	"	19,	"	36
"	"	"	1⅛	"	"		3⅝	"	"	19,	"	38
"	"	"	3⅛	"	"		1⅛	"	"	19,	"	41
"	"	"	1⅜	"	"		3⅝	"	"	19,	"	48
"	"	"	1¾	"	"		4	"	"	19,	"	65
"	"	"	2	"	"		4¼	"	"	19,	"	1 00
"	"	"	2⅛	"	"		5	"	"	19,	"	1 50

Smaller than ⅛ inch.....Special
2 inch to 3 inch, to No. 19, inclusive 38
3 inch..... 40
Over 3 inch to 3½ inch..... 45
Over 3½ inch..... 50

Bronze and copper advance 3 cents. Discount 30 per cent.

PRICE LIST FOR SHEET ALUMINUM

PLATE AND SHEET PRICE LIST.—B. & S. GAUGE.

Prices are for 50 pounds or more at a time. Less quantities, 5 cents per pound additional. Charges made for boxing.

Wider Than.. And Including...	8 in. 12 in. in coils.	6 in. 14 in.	14 in. 16 in.	16 in. 18 in.	18 in. 20 in.	20 in. 24 in.	24 in. 30 in.	30 in. 36 in.	36 in. 40 in.	40 in. 45 in.	45 in. 50 in.	50 in. 55 in.	55 in. 60 in.	Polishing One Side.	Sat. Fin. without Lacquer. One Side.	Satin Finish two sides double above prices.	Polished two sides double above prices.
No. 13 & heavier		Not wider than 6 in.												2	6		
" 14														2	6		
" 15														2	6		
" 16														2	6		
" 17														2	6		
" 18														2	6		
" 19														2	6		
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" 32														2	6		
" 33														2	6		
" 34														2	6		
" 35 & 36														2	6		
" 37 & 38														2	6		
" 39 & 40														2	6		
" .008" to .0015"	1 67													2	6		
Less than .0015"	1 98													2	6		
	2 33													2	6		
	2 42													2	6		
	2 66													2	6		

Additional charge for slitting coiled sheet in widths less than 3 in. and flat rolled sheets in widths less than 6 in.
All columns except the first are for Flat Rolled Sheets.

Discounts as follows are given for sheet orders over 200 pounds.

200 to 1,000 pounds	10 per cent. off list.				
1,000 to 2,000 "	10 per cent. and	2	"	"	
2,000 to 4,000 "	10 "	"	3	"	"
4,000 pounds and over	10 "	"	5	"	"

Sheets polished or satin-finished on both sides, double the price for one side.

Price Per Foot of Seamless Aluminum Tubing.

(CHARGES MADE FOR BOXING.)

THICKNESS OF WALL IN STUBS' GAUGE.

Outside Diameter in Inches.	No. 12.	No. 14.	No. 16.	No. 18.	No. 20.	No. 22.	No. 24.	Outside Diameter in Inches.
1-4	.....	.....	.....	10	9	8	7	1-4
5-16	.....	.....	.....	11	9	8	7	5-16
3-8	.....	.....	.....	12	9	8	7	3-8
1-2	.....	.....	17	14	11	9	8	..... 1 2
5-8	.....	.....	21	16	13	12	.....	5-8
3-4	.....	.....	25	19	16	14	.....	 3-4
7-8	.....	.....	28	22	18	16	.....	7-8
1	.....	.....	30	25	21	19	.....	.....1 00
1 1-4	.....	.....	36	30	25	.....	.....	.....1 1 4
1 1-2	.....	52	43	35	28	.....	.....	.....1 1-2
1 3-4	.....	60	50	41	33	.....	.....	..... 1 3-4
2	84	68	58	47	37	.....	.....	.....2 00

Discount 20 to 30 per cent.

ALUMINUM

Drawn Rod and Wire Price List.—B. & S. Gauge.

Diameter B.& S.G'ge.	0000 to No. 10	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price per lb	$ 38	38½	38½	0 39	39½	0 40	40½	0 41	0 42	0 43	0 44	0 47	0 52

200 lbs. to 30,000 lbs., three cents off list.
30,000 lbs. and over, four cents off list.